

Viscous Material Dispenser Piston

Field of the Disclosure

This invention relates to viscous dispensers and more particularly to a piston for use with a dispenser of highly viscosity viscous materials.

Background

Viscous material dispensers, some of which are known as caulking guns, are now well known. A dispenser described and claimed in United States Patents 5,775,539 and 5,909,830 issued July 7, 1998 and June 8, 1999 (herein The Patents) is a high pressure dispenser that has enjoyed commercial success. The dispenser's success has been in mixing and dispensing two part materials of high viscosity. An example of such a material is that material which is used in installing replacement windshields and rear windows in automobiles.

The Patents disclose and claim a piston which when made into high precision prototypes preformed quite well when dispensing materials in tests. However, pistons of the type disclosed in The Patents when produced in quantities did not prove fully satisfactory when used with one commercially available two part adhesive having one of its to be mixed parts housed in an aluminum alloy foil "sausage" skin. When the piston of The Patents, is used with this particular two part material the sausage skin all too frequently bypasses the flexible lip of a piston and extends between the piston and a surrounding, close fitting, wall of the dispenser

Summary of the Disclosure

A piston of an organic material is provided. The piston has a material engaging face surface at its front with a cylindrical forward projection surrounded by an annular recess. A piston lip surrounds the recess. The lip flares outwardly as it extends forwardly from the face surface. An annular expansion plate or camming washer is positioned in the recess and located in axial alignment with the piston by the forward projection.

The plate has a perimeter surface which tapers outwardly from front to back.. When dispensing force is applied to the back of the piston and the plate, the tapered surface forces the piston lip outwardly into tight sliding contact with a cylindrical internal wall of a dispenser. The higher the viscosity of the material being dispensed the greater the force used to dispense the material and as a result a greater outward force is applied to the piston lip assuring that the sausage skin will not pass between the lip and the internal wall.

Brief Description of the Drawings

Figure 1 is a side elevational view of a battery operated viscous material dispenser with parts broken away and removed, the dispenser being equipped with the piston assembly of the present disclosure;

Figure 2 is an exploded view of the piston assembly;

Figure 3 is an exploded cross sectional view on an enlarged scale of the piston assembly; and,

Figure 4 is a cross sectional view of the piston assembly on the scale of Figure 3.

Detailed Description

Figure 1 is a replication the viscous dispenser 10 of Figure 1 of The Patents modified to show the piston assembly of the present disclosure at P. The dispenser includes a handle section

11 and a cartridge support section 12. The support section includes an end wall 15 having a nozzle receiving slot, no shown. A cartridge containing material to be dispensed is shown in phantom at 18. The cartridge includes a dispensing nozzle 20 which extends through the slot while an end of the cartridge 22 abuts the end wall 15.

An elongate rod 24 extends axially into the support section 12. The piston P is connected to a forward end of the rod such that axially movement of the rod will cause comparable axial movement of the piston. An electric motor 28 is mounted in a rearward portion of the handle 11. The motor is connected to gearing within a gear box 30. The gear box has an output shaft 32. The shaft drives a gear train 34, 35, 45, 46, 48 as described more fully in the patents. The gear train drives a pinion 50 which in turn drives a rack 52 formed on the rod 24.

A trigger 54 is connected to the handle section 11 by a pivot 55. An arm 56 of the trigger coacts with a control arm 57 of a speed control switch 58. The speed control switch is electrically connected to a battery 68. Operation of the motor 58 to advance the rod 24 is described more fully in The Patents.

The Piston P

The piston P includes a main plastic body 70 which is preferably made of nylon. The body is unitary and of circular cross section. The rod has a reduced diameter end portion 72 which is disposed in a rearward large diameter section of a through bore 74 of the main body 70. The rod has a shoulder 76 which abuts a rear wall section 78 of the body 70. A bolt 79 is disposed in the through bore and threaded into the rod end portion. A head of the bolt 79 is disposed in a counterbore 80 in a face surface 81 of the main body. The bolt head abuts a shoulder 82 at the base of the counterbore 80 to fix the main body 70 and the rod 24 together.

The main body 70 includes a perimeteral lip 84 which when in use closely engages a cylindrical inner surface of a material cartridge 18. The remainder of the perimeteral surface of the body rearward of the lip is cylindrical. The lip 84 surrounds a recess 85 in the face 81 of the body 70. The recess flares outwardly and rearwardly from an annular central or nose section 86 having a surface normal to the axis of the piston. The recess has its greatest depth from the plane of the central section surface adjacent the lip 84. An annular disc or camming washer 87 is disposed in the recess 85. The washer has an outwardly tapering thickness such that it is at its thickest at its perimeter and it nests nicely in the flaring recess 85.

The washer may be made of metal such as an aluminum alloy but the currently preferred material is a polymer sold under the trademark Delran. The camming washer is secured to the main body 70 by a pair of screws 88. As is best seen in Figure 4, the screws extend through small apertures 90 in the camming washer and small compressible O rings 91. The screws 88 are threaded into the main body 70 to secure the camming washer in place with the O rings trapped between the washer and the main body.

As is best seen in Figures 3 and 4, the camming washer has a tapering perimeteral camming surface 94. The surface 94 tapers from its largest diameter adjacent a face 95 of the washer to its smallest diameter in the recess 85. The camming surface 94 engages and coacts with the perimeteral lip 84.

Operation

In operation the rod 24 is retracted and a cartridge is inserted into the cartridge support section 12. The rod is then advanced until the piston has entered the cartridge and the camming washer engages a "sausage" containing the material to be dispensed. As the piston is further advanced by operation of the motor 28. As motor operation continues to advance the piston

against the resistance of the material being dispensed, the camming washer is pressed further into the recess 85. Thus, there is relative axial movement between the washer 88 and the main body 70. This relative movement compresses the O rings 90 and causes the camming surface 94 to act against the lip 84. The action of the camming surface forces the lip outwardly into a tight wiping relationship with walls of the cartridge from which material is being dispensed. The outward deformation of the lip is graphically illustrated by the phantom lines of Figure 3.

Tests have shown the piston assembly described and shown here to be highly effective when used with any present day cartridge. In all such tests the "sausage skin" of every cartridge tested was cleanly maintained on the material side of the piston and the skin did not find its way between the perimeter of the piston and the inner wall of a cartridge from which material was dispensed.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction, operation and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.